# SUBSTITUTE SPECIFICATION

## Plastic Optical Fiber Bundle with Patterned Illumination Depressions

## Background of the Invention

### Field of the Invention

The present invention is related to plastic optical fiber bundle with spaced illumination depressions, especially to a plastic optical fiber bundle with patterned depressions on its surface to produce illumination effect.

### Description of the Prior Art

As shown in FIG. 1, ordinary connection lines have a string of bulbs with different colors in a transparent plastic pipes to produce illumination effect. The bulbs 1'1 of the bulb string structure 1' connect to each other and produce an offending flashing effect when the power is turned on. However, this bulb string structure brings overheat easily and, thus, may cause fire. The production cost of this bulb string structure is high.

### Summary of the Invention

The objective of the present invention is to provide a plastic optical fiber bundle with patterned illumination depressions without the disadvantage of the ordinary connection lines. The outer layer of a plastic optical fiber is formed with depressions based on an appropriate spacing unit before it is finally shaped during the fiber drawing process, so that a spaced or patterned light leak effect is produced at the positions where the surface of the plastic optical fiber is formed with depressions in a spaced pattern based on an appropriate spacing unit. The plastic optical fiber bundle with patterned illumination depressions of the present invention has a protection sleeve on its surface and an illumination structure on each end, so that it can be used as an illumination decoration for different applications.

The present invention is further described with the following figures:

FIG. 1 is a conventional connection line;

FIG. 2-1 shows the 1st view of the plastic optical fiber bundle of the present invention;

FIG. 2-2 shows the 2nd view of the plastic optical fiber bundle of the present invention;

FIG. 2-3 shows the 3rd view of the plastic optical fiber bundle of the present invention;

FIG. 2-4 shows the 4th view of the plastic optical fiber bundle of the present invention;

FIG. 3 shows the cross-sectional view of the plastic optical fiber bundle of the present invention;

FIG. 4 shows the light leak schematic view of the plastic optical fiber bundle of the present invention;

FIG. 5-1 shows the cross-sectional view of the plastic optical fiber bundle in an embodiment of the present invention; and

FIG. 5-2 shows the side view of the plastic optical fiber bundle in an embodiment of the present invention.

**4. Detailed Description of the Preferred Embodiments**

The present invention is directed to a plastic optical fiber bundle with patterned illumination depressions. PMM A and PTFE B are fed simultaneously to form an outer layer and an inner layer, respectively. The materials are molten and extruded and then spun through a spinning nozzle to form a molten two-layer plastic optical fiber. The surface of the molten plastic optical fiber P is formed with depressions in a pattern based on an appropriate spacing unit ~~formed~~ by means of a special mold before the molten plastic optical fiber is cooled on a cooling plate. During the process of forming the depressions, only the outer layer is formed with depressions without affecting the inner layer. The plastic optical fiber P with patterned depressions is distributed with spaced dot-shaped depressions (a) on its surface (FIG. 2-1); The plastic optical fiber P with patterned depressions is distributed with patterned "+"-shaped depressions (b) and "-"-shaped depressions (c) on its surface (FIG. 2-2); The plastic optical fiber P with patterned depressions is distributed with patterned square-shaped depressions (d) on its surface (FIG. 2-3); The plastic optical fiber P with patterned depressions is distributed with patterned star-shaped depressions (e) on its surface (FIG. 2-4). As shown in FIG. 3, a plastic optical fiber bundle with patterned illumination depressions (1) is formed by

individual plastic optical fibers P1, ... Pn with patterned illumination depressions. A protection sleeve C is put onto the outer layer of the plastic optical fiber bundle with patterned illumination depressions 1.

The surface of the plastic optical fiber bundle with patterned illumination ~~decorations~~ depressions 1 as shown in FIG. 4 is formed and distributed with holes 01-01n, 02-02n and 03-03n. The plastic optical fiber P with patterned depressions is distributed with ~~spaces~~ spaced regions P', P", P"' on its surface. When light radiates into the plastic optical fiber P with patterned depressions, the light is refracted to the P', P", P"' distribution areas to produce a light leak effect distributed in a patterned manner. When the power is turned on and the luminary L illuminates, the plastic optical fiber bundle with patterned illumination depressions 1 produces a light leak and decoration effect that is distributed in the patterned depression areas D1, D1n, D2, D2n. A connector W is installed between the plastic optical fiber bundle with patterned illumination depressions 1 and the plastic optical fiber bundle with patterned illumination depressions 1'' for permanent connection.

The present invention is a plastic optical fiber bundle with patterned illumination depressions and the plastic optical fiber producing the light leak effect has the following characteristics:

(1) The plastic optical fiber is formed with depressions in a spaced manner based on an appropriate unit during the fiber drawing process;

(2) The plastic optical fiber bundle with patterned illumination depressions of the present invention does not bring overheat or cause fire; and

(3) The connection line with patterned illumination depressions of the present invention radiates soft light that does not offend people's eyes.